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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/777,876	02/07/2001	Arnaud Gueguen	202888US2	4116
22850	7590	06/03/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			DEPPE, BETSY LEE	
			ART UNIT	PAPER NUMBER
			2637	

DATE MAILED: 06/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/777,876

Applicant(s)

GUEGUEN, ARNAUD

Examiner

Betsy L. Deppe

Art Unit

2637

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7,9-12,25 and 26 is/are rejected.
- 7) ☒ Claim(s) 8 and 13-24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed January 28, 2005 have been fully considered but they are not persuasive.
2. In response to applicant's argument on page 19 that Kim et al. does not disclose that the error checker determines or uses a threshold quantity and therefore, Kim et al. does not each or suggest "determining a threshold quantity characteristic of said decoding," steps 340 and 360 in Figure 3 of Kim et al. determines whether an error is generated and then stops iterative decoding when no error is detected. (See column 6, lines 11-23) The error corresponds to "characteristic quantity" in claim 1 and since Kim et al. stops iterative decoding when no error is detected, the "threshold quantity" in the recited claim is zero. It is inherent that there is a determination of the threshold quantity in order to set the threshold quantity.
3. In response to applicant's argument on pages 19-20 that the CRC transmitted is not generated from each set of weighted output information items and that the CRC in Kim et al. is not equivalent to the characteristic quantity, the error signal that generated from the CRD check is equivalent to the characteristic quantity since the error signal is determined after the decoding. (See 190 in Figure 1)

4. In response to applicant's argument on page 20 that Yi fails to disclose "determining a threshold quantity characteristic" and "comparing said characteristic quantity with said threshold quantity," one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, Kim et al. discloses these limitations and the rejection of the claims is based on the combination of Kim et al. and Yi.

5. In response to applicant's argument on pages 21-22 that there is insufficient evidence for motivation to modify the DAB system of Yi by incorporating the error checker of Kim et al., the Examiner is not suggesting the incorporation of the error checker in Kim et al. into the DAB system of Yi. Yi is cited to show that an iterative Turbo decoder is used with a corresponding Turbo code encoder. (See Figures 3 and 6; column 8, line 21 - column 9, line 26; and column 12, lines 14-46) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Kim et al. and Yi to form a data transmission system comprising a Turbo encoder and a corresponding decoder for error correction wherein the number of iterations in the decoding scheme are minimized.

Although Yi teaches using Turbo encoders and decoders in a DAB system, it is well-known to use these error control systems for data transmission in different applications or systems, i.e. the use of Turbo encoders and decoders are not exclusive

to DAB systems. (For example, see Ebel, Sr. (US Patent No. 6,879,648 B2) and Wolf et al. (US Patent No. 6,898,254 B2)) Since the iterative decoding method of Kim et al. minimizes processing delays (see column 2, lines 7-10), it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the iterative decoding method disclosed by Kim et al. with a Turbo encoder such as that disclosed by Yi.

Furthermore, even though Kim et al. does not suggest incorporating an error check in a DAB system, Kim et al. does not preclude the use of the disclosed apparatus and method in a DAB system nor does it limit the use to transmission of a particular type of data or signal.

### ***Drawings***

6. The drawings were received on January 28, 2005. Figures 1 and 2 of these drawings are accepted.

### ***Claim Objections***

7. Claim 1 is objected to because of the following informalities: on line 16, "a threshold quantity characteristic" should be "a threshold quantity" in order to be consistent with line 10 and dependent claims (for example, see claim 6, line 3).

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. (US Patent No. 6,615,385 B1 cited in the Office Action mailed April 16, 2004) in view of Yi (US Patent No. 5,907,582 cited in the Office Action mailed October 28, 2004).

10. With regard to claim 1, Figures 1 and 3 of Kim et al. discloses the claimed invention including (a) an iterative decoding comprising a plurality of elementary decoding steps (120 and 150 in Figure 1) associated with interleaving and deinterleaving steps wherein each of the elementary decoding steps receive a set of information and generates a set of weighted output information items; (b) generating a characteristic quantity from each set of weighted output items generated by each of said elementary decoding steps (see column 5, lines 9-11); (c) comparing said characteristic quantity to a threshold quantity (see step 340 and 360 in Figure 3); and (d) interrupting said decoding when said characteristic quantity (i.e. the errors determined using CRC) reaches the threshold quantity (see step 390 in Figure 3). (See also column 5, line 62 – column 6, line 35)

However, Kim et al. does not teach the recited coding step and the plurality of elementary decoding steps corresponding to a plurality of elementary coding steps

associated with at least one interleaving step. Yi discloses a system with a turbo code encoder in Figure 3 and an iterative Turbo decoder in Figure 6 wherein the elementary decoding steps correspond to the plurality of coding steps. (See also column 8, line 21-column 9, line 26 and column 12, lines 14-46) Since Kim et al. does not provide details of the Turbo encoder, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the receiver of Kim et al. in a communication system with the transmitter/encoder of Yi in order to recover turbo coded data without incurring undue processing delay (see Kim et al. column 2, lines 7-10).

11. With regard to claim 26, Kim et al. in view of Yi discloses the claimed invention including a puncturing step in the coding step and a corresponding depuncturing step in the decoding step. (See Yi, figures 3 and 6; column 9, lines 1-26; and column 12, line 37-43) It would have been obvious to one of ordinary skill in the art at the time the invention was made to also implement the puncturing and depuncturing taught by Yi into the method disclosed by Kim et al. in view of Yi in order to provide greater flexibility in the code rate by enabling a change in the turbo rate without modifying the encoders.

12. Claims 2-5 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Yi as applied to claim 1 above, and further in view of Haller et al. (US Patent No. 6,182,261 B1 cited in the Office Action mailed October 28, 2004).

13. With regard to claim 2, Kim et al. in view of Yi discloses the claimed invention except for calculating a quantity characteristic of a set of extrinsic information. Haller et al. teaches calculating a quantity characteristic (i.e. LLR) of a set of extrinsic

information. (See column 10, lines 48-51) It would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate a quantity characteristic (i.e. LLR) of a set of extrinsic information in Kim et al. in view of Yi in order to accurately decode the data by assessing the reliability of the information.

14. With regard to claim 3, Kim et al. discloses the claimed invention except for calculating a statistical quantity characteristic of the set of weighted output information items. Haller et al. teaches calculating a statistical quantity (i.e. LLR) of a set of weighted output information items. (See column 10, lines 29-39) It would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate a statistical quantity characteristic of the set of weighted output information items in Kim et al. in order to accurately decode the data by assessing the reliability of the information.

15. With regard to claim 4, Kim et al. in view of in view of Yi and Haller et al. discloses the claimed invention except for calculating a means of an absolute value. Since Haller et al. discloses using an absolute value of probability values (see column 10, lines 29-33) or calculating an average or median of probability bits (see column 10, lines 56-58), it would have been obvious to one of ordinary skill in the art at the time the invention was made to also calculate the average/means of the absolute value in order simplify calculations by using only the absolute value while obtaining an accurate assessment of the probability bits over time.

16. With regard to claim 5, Kim et al. in view of Yi and Haller et al. discloses the claimed invention including interrupting the decoding procedure when the characteristic



quantity is greater than the threshold quantity. (See Haller et al. column 10, lines 39-45)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the conditions for stopping iterative decoding as disclosed by Haller et al. into the method taught by Kim et al. in order to provide greater flexibility in determining when to stop the iterative decoding and to avoid iteratively decoding the received data when the received data is of sufficient quality but not necessarily error-free, as required by the method in Kim et al.

17. With regard to claim 25, Kim et al. in view of Yi and Haller et al. discloses the claimed invention including the inputs and outputs of elementary decoding steps being weighted, in terms of probabilities, likelihood ratios or log likelihood ratios. Since Haller et al. discloses that iterative decoding techniques use LLR probabilities and soft data from former iterations (see Haller et al. column 1, line 56 - column 2, line 10), it is implicit that the inputs and outputs of the decoders in Kim et al. are weighted, in terms of probabilities, likelihood ratios or log likelihood ratios

18. Claims 6, 9, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Yi as applied to claim 1 above, and further in view of Zhang et al. (US Patent No. 6,233,709).

19. With regard to claim 6, Kim et al. in view of Yi discloses the claimed invention except for determining the threshold quantity as a function of at least one configuration parameter. Zhang et al. teaches varying a threshold quantity (e.g. the number of iterations) as a function of at least one configuration parameter based on a quality of

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service (QoS) requirements. (See column 1, lines 61 - column 2, line 13 and column 3, lines 46-63) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the teaching of Zhang et al. into the method disclosed by Kim et al. in view of Yi in order to provide greater flexibility and to ensure quality of service in a changing environment without any unnecessary processing delays.

20. With regard to claim 9, Kim in view of Yi and Zhang et al. discloses the claimed invention including selecting, using a reference table, the threshold quantity. (See Zhang et al. column 2, lines 9-14 and column 3, lines 58-63)

21. With regard to claims 11 and 12, Kim et al. in view of Yi and Zhang et al. discloses the claimed invention except for determining the threshold quantity as a function of mean transmission time or mean energy consumption. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use different factors for determining the threshold quantity based on system requirements. The applicant has not disclosed that using a mean transmission time or mean energy consumption provides an advantage, is used for a particular purpose or solves a stated problem. Therefore, one of ordinary skill in the art would have considered different factors that affect the accuracy of data recovery and meet system requirements when determining the threshold quantity of the circuit disclosed by Kim et al. in view of Yi and Zhang et al.

22. Claims 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Yi and Zhang et al. as applied to claim 6 above, and further in view of Doetsch et al. (WO 99/11009).

23. With regard to claim 7, Kim et al. in view of Yi and Zhang et al. disclose the claimed invention except for at least one of the recited configuration parameters.

Siemens discloses that the signal to noise ratio affects a quantity threshold (i.e. the number of iterations) for a given quality of service criterion. (See page 11, lines 16-24) Since Kim et al. in view of Yi and Zhang et al. discloses varying quantity threshold based on quality of service requirements (see Zhang et al. column 1, line 66 - column 2, line 6), it would have been obvious to one of ordinary skill in the art at the time the invention was made to use signal-to-noise ratio instead of the bit error rate to adjust the quantity threshold since they are both indicators of signal quality. Selecting an indicator of signal quality for adjusting the quantity threshold depends upon system considerations such as whether one is easier to determine or simplifies the circuit.

Furthermore, the applicant has not disclosed that any of the recited configuration parameters provides an advantage, is used for a particular purpose or solves a stated problem. Therefore, one of ordinary skill in the art would have considered different configuration parameters, including signal-to-noise ratio as disclosed by Doetsch et al., that affect the accuracy of data recovery when determining the threshold quantity of the circuit disclosed by Kim et al. in view of Yi and Zhang et al.

24. With regard to claim 10, Kim et al. in view of Yi and Zhang et al. disclose the claimed invention except for selecting the threshold quantity based in part on a

complexity of the decoding. Doetsch et al. discloses varying a quantity threshold (i.e. the number of iterations) based on coding complexity. (See page 11, lines 12-16). Since decoding complexity corresponds to coding complexity, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the threshold quantity in Kim et al. in view of Yi and Zhang et al. based on the decoding complexity in order to provide greater flexibility and for accurate data recovery without requiring unnecessary processing delays.

#### ***Allowable Subject Matter***

25. Claims 8 and 13-24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

26. The following is a statement of reasons for the indication of allowable subject matter: prior art of record does not teach or suggests in combination a digital transmission comprised of a determining step that includes the step recited in claims 8 and 13, respectively.

#### ***Conclusion***

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents disclose iterative decoders: Kim et al. (US

Patent No. 6,876,709 B1); Ebel, Sr. (US Patent No. 6,879,648 B2); Nazari et al. (US Patent No. 6,888,897 B1) and Wolf et al. (US Patent No. 6,898,254 B2)

28. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

29. Although the rejection of claims 2-5 and 25 include a reference to Yi, they have not been substantively changed from the Office Action of October 28, 2005. As dependent claims of claim 1, the rejection of these claims are based on the rejection of claim 1. In the last Office Action, the rejection indicated that the claims were rejected based on the references as applied to claim 1 but the Examiner inadvertently omitted citing the Yi in the rejection of the claims. In this Office Action, the Examiner has corrected the omission by including a proper reference to Yi in order to be consistent with the prior art applied in the rejection of claim 1 from which claims 2-5 and 25


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depend. Therefore, the rejection of claims 2-5 and 25 are not based on a new ground of rejection and the finality of this action is proper.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Betsy L. Deppe whose telephone number is (571) 272-3054. The examiner can normally be reached on Monday, Wednesday and Thursday (8:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571) 272 - 2988. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Betsy L. Deppe  
Primary Examiner  
Art Unit 2637